

REMARKS

Claims 1-4, 7-8, 11, 15, 30-41, 44-51, and 53-63 are currently pending. Claims 1 and 41 have been amended to clarify the invention. Applicants respectfully submit that the claimed invention is patentable over the references applied by the Examiner.

I. Claim Rejections - 35 U.S.C. § 102

The claimed invention involves making a device or matrix for the controlled release of at least one pesticide at a rate from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$. This release rate is achieved by forming a mixture comprising at least one liquid pesticide, a plurality of carrier particles, and a polymer so as to bind the pesticide to the carrier particles to reduce the pesticide release rate to from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$ and forming the pesticide-containing carrier particles and polymer into a controlled release matrix having pesticide-containing carrier particles dispersed throughout the polymer. Alternatively, this release rate is achieved by binding at least one liquid pesticide to carrier particles to produce pesticide-containing carrier particles and combining the pesticide-containing carrier particles and a polymer to produce a controlled release device to achieve the claimed release rate. Simply adding a carrier to a mix of pesticide and pre-polymer without creating the claimed pesticide-containing carrier particles would result in poor formability of the controlled release device and would permit rapid evaporation of the pesticide.

Assuming arguendo that SU 1690654 (SU '654) has been properly applied as a reference under 35 U.S.C. § 102(b), Applicants respectfully submit that claims 1, 3-4, 8, 32, 37-38, 41, 46-47, 51, 54-55, 57-58, and 62 are patentable over SU '654. SU '654 neither discloses binding a liquid pesticide to carrier particles as called for in step (a) of independent claim 1 nor the step of binding a liquid pesticide to carrier particles as called for in step (a) of independent claim 41. By binding a liquid pesticide to carrier particles, the claimed invention achieves long-term pesticide release for long-term retardation or prevention of decay or deterioration of wooden objects. SU '654 does not disclose the claimed binding steps and instead discloses sifting a carrier (hydrolytic lignin) through a sieve, mixing the carrier with pesticide (permethrin) on a mixer, adding polymer (calcium lignosulfonate), and mixing and granulating the resulting mixture on an extruder. Page 1, lines 7-13. Nowhere in SU '654 is there disclosed the binding steps of independent claims 1 or 41. In fact, the SU '654

formulation is not brought to a sufficient enough temperature so that the pesticide and carrier become bound together. In addition, because SU '654 does not employ the claimed binding step, there is no indication that SU '654 could achieve the claimed pesticide release rate of from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$ as required in independent claims 1 and 41.

SU '654 also fails to disclose binding pesticide to carrier particles to form pesticide-containing carrier particles and achieve a pesticide release rate of from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$ as required in step (a) of independent claim 1 or binding pesticide to carrier particles to produce pesticide-containing carrier particles and achieve a pesticide release rate of from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$ as required in steps (a) and (b) of independent claim 41. As discussed above, because SU '654 does not employ the claimed binding step, there is no indication that SU '654 could achieve the claimed pesticide release rate of from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$ as required in independent claims 1 and 41.

In addition, SU '654 fails to disclose a liquid pesticide as required in independent claims 1 and 41. Rather, the pesticide in SU '654, permethrin, is in solid form. Page 1, lines 7-10. SU '654 also fails to disclose a method of making a device or matrix which is effective in retarding or preventing decay or deterioration of a wooden object by pests. Rather, SU '654 is directed to a chemical means for protecting plants. Page 1, lines 1-3.

Moreover, nowhere in SU '654 is there disclosed a controlled release matrix having pesticide-containing carrier particles dispersed throughout the polymer as called for in step (b) of independent claim 1. By dispersing pesticide-containing carrier particles throughout the polymer, the claimed invention is able to achieve long-term retardation or prevention of decay or deterioration of wooden objects. There is no disclosure in SU '654 of creating pesticide-containing carrier particles or of dispersing pesticide-containing carrier particles throughout the polymer as a mechanism to control the pesticide release rate as required in claim 1.

For the foregoing reasons, independent claims 1 and 41 are not anticipated by SU '654. Dependent claims 3-4, 8, 32, 37-38, 46-47, 51, 54-55, 57-58, and 62 which depend from independent claims 1 and 41 are not anticipated by SU '654 for at least the same reasons. Accordingly, withdrawal of the rejection of claims 1, 3-4, 8, 32, 37-38, 41, 46-47, 51, 54-55, 57-58, and 62 based on SU '645 is respectfully requested.

Applicants also respectfully submit that claims 1, 3, 8, 11, 34, 36-38, 44, 46-47, and 51 are patentable over JP 62236937 (JP '937). JP '937 does not disclose the step of binding a

sufficient amount of liquid pesticide to carrier particles to reduce the pesticide release rate to the range of from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$ as called for in step (a) of claim 1 or in steps (a) and (b) of claim 41. JP '937 does not disclose the claimed binding step and instead discloses mixing a first solution containing polyol as urethane prepolymer, pesticide, and microparticles with a second solution containing isocyanates. Translation, page 2, lines 25-27. Nowhere in JP '937 is there disclosed a step of binding a sufficient amount of liquid pesticide to carrier particles. In addition, because JP '937 does not employ the claimed binding step, there is no indication that JP '937 could achieve the claimed release rate of from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$.

JP '937 also fails to disclose a controlled release matrix having pesticide-containing carrier particles dispersed throughout the polymer as required in claim 1, step (b). The claimed invention achieves long-term retardation or prevention of decay or deterioration of wooden objects by dispersing bound pesticide-containing carrier particles throughout the polymer. JP '937, in contrast, operates to control pesticide release by using different sized microparticles to create gaps between the larger and smaller sized particles and filling the gaps with urethane polymer to form a pesticide releasing micro-passage. *Id.* at page 3, lines 5-15. There is no disclosure in JP '937 of creating pesticide-containing carrier particles or of dispersing pesticide-containing carrier particles throughout the polymer as a mechanism to control the release rate of pesticide.

For the aforementioned reasons, claims 1, 3, 8, 11, 34, 36-38, 44, 46-47, and 51 are not anticipated by JP '937. Accordingly, withdrawal of the rejection of these claims based on JP '937 is respectfully requested.

Assuming arguendo that the article entitled "Long-Term Controlled-Release of Herbicides: Root-Growth-Inhibiting Biobarrier Technology" by Van Voris et al. ("Van Voris") has been properly applied as a reference under 35 U.S.C. § 102(b), Applicants respectfully submit that claims 1, 3, 7-8, 30, 33-39, and 44-45 are patentable over Van Voris.

Van Voris does not disclose the step of binding a sufficient amount of liquid pesticide to carrier particles to reduce the pesticide release rate to from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$ as called for in claim 1, step (a) and claim 41, steps (a) and (b). Van Voris discloses a formulation consisting of powdered polymer, carbon black, and pesticide which is injection-molded into pellets. Page 10, lines 27-38. Nowhere in Van Voris is there disclosed a step of binding a sufficient amount of liquid pesticide to carrier particles to form or produce pesticide-

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containing carrier particles as required by the present claims. In addition, there is no indication that the Van Voris formulation achieves the claimed release rate of from 0.4 – 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$.

In addition, Van Voris does not disclose a controlled release matrix having pesticide-containing carrier particles dispersed throughout the polymer as called for in claim 1, step (b). Van Voris does not disclose creating pesticide-containing carrier particles or dispersing pesticide-containing carrier particles throughout the polymer as a mechanism to control the pesticide release rate.

For the above reasons, claims 1, 3, 7-8, 30, 33-39, and 44-45 are not anticipated by Van Voris. Accordingly, withdrawal of the rejection of these claims based on Van Voris is respectfully requested.

As the references applied by the Examiner neither teach nor disclose the approach as presently claimed, withdrawal of the rejection of the claims is respectfully requested.

II. Information Disclosure Statement

During the interview held on January 30, 2002, the Examiner requested that Applicants provide dates for references G1 and G2 that were submitted with Applicants' November 1, 2001 Letter and Acknowledgment of Telephone Conference and PTO-1449 form. Reference G1 (J. Hughes, "Controlled Release Technology Inhibits Root Growth," *Controlled Release*, p. 15) was published in the summer of 1989. Reference G2 (P. Van Voris et al., manuscript entitled "Long-Term Controlled-Release of Herbicides: Root-Growth-Inhibiting Biobarrier Technology," pp. 1-19) was submitted for publication in 1988 and was published as Reference R2 in the enclosed Supplemental Information Disclosure Statement (IDS) and PTO-1449 form.

Applicants also note that References P3 (JP 62236937); P4 (SU 1690654 A1); and R1 (N.N. Mel'nikov, Chemistry and Technology of Pesticide, Moscow, Khimiya, 1974, pp. 26-30 (translation) in the enclosed IDS and PTO-1449 form are being resubmitted as Applicants have not received an initialed PTO-1449 form making these references of record. References P3, P4, and R1 were previously submitted as references H01, H02, and J01, respectively, with Applicants' December 21, 2001 IDS and PTO-1449 form.

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Applicants respectfully request that the above references along with the newly cited references in the enclosed IDS and PTO-1449 form be considered and made of record by the Examiner.

III. Enclosures

Attached hereto as Appendix A is a clean copy of the pending claims entitled "Pending Claims Per Response to Office Action Dated February 28, 2002."

As discussed above, an IDS and PTO-1449 form are also enclosed.

IV. Claims 38 and 41

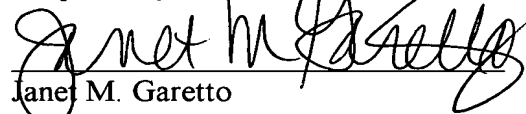
Applicants note that there was a discrepancy between the marked-up and clean version of claims 38 and 41 in the Amendment submitted on September 5, 2001. Applicants intended for claims 38 and 41 to be amended as shown in Appendix A entitled "Version with Markings to Shows Changes Made" attached to the September 5, 2001 Amendment. If anything additional is required in connection with this issue, the Examiner is requested to contact the undersigned attorney at the number indicated.

V. Conclusion

If there are any matters which may be resolved or clarified through a telephone interview, the Examiner is requested to contact the undersigned attorney at the number indicated. Should any additional fees be required (except for payment of the issue fee), the Commissioner is authorized to deduct the fees from Jenkins & Gilchrist, P.C. Deposit Account No. 10-0447, Order No. 47309-00025USC1.

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APPENDIX A

**Pending Claims Per Response to Office Action
Dated February 28, 2002**

1. (Five Times Amended) A method of making a matrix for controlled release of at least one pesticide useful for retarding or preventing decay or deterioration of a wooden object by pests, the method comprising the steps of:

(a) forming a mixture comprising at least one liquid pesticide, a plurality of carrier particles, and a hydrophobic thermoplastic polymer to bind a sufficient amount of the pesticide to the carrier particles to form pesticide-containing carrier particles so as to reduce the release rate of the pesticide from the controlled release matrix to the range from 0.4 $\mu\text{g}/\text{cm}^2/\text{day}$ to 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$; and

(b) forming the pesticide-containing carrier particles and the polymer into a controlled release matrix having pesticide-containing carrier particles dispersed throughout the polymer.

2. The method as recited in claim 1, wherein the at least one pesticide is in a solid form, said method further comprising the step of heating at the least one solid pesticide to convert it into liquid form prior to said binding step.

3. The method as recited in claim 1, wherein said hydrophobic polymer has a hydrophobicity of less than about 13 on either the hydrophilic lipophilic balance or solubility parameter scale.

4. The method as recited in claim 1, wherein said forming comprises enveloping said mixture as an inner part within a second hydrophobic polymer.

7. The method as recited in claim 1, wherein said hydrophobic thermoplastic polymer is selected from the group consisting of low density polyethylene, high density polyethylene, vinyl acetate, polyester, silicone, neoprene, isoprene and combinations thereof.

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8. The method as recited in claim 1, wherein at least one said pesticide has a vapor pressure in the range from 1 nPa to 100 mPa.

11. The method as recited in claim 1, wherein said pesticide is water soluble.

15. The method as recited in claim 1, wherein said pesticide is selected from the group consisting of biphenyl, dichlorophen, tri-chloronitromethane, and combinations thereof.

30. The method claimed in claim 1 wherein the forming step is performed by injection molding.

31. The method claimed in claim 1 wherein the at least one pesticide is a fungicide.

32. The method claimed in claim 31 wherein the at least one pesticide further includes a pesticide for eliminating wood boring insects.

33. The method claimed in claim 1 wherein the matrix is formed into a pellet.

34. The method claimed in claim 1 wherein the matrix is formed into a sheet.

35. The method claimed in claim 1 wherein the matrix is formed into strips.

36. The method claimed in claim 1 wherein said carrier comprises from about 3 to about 30 weight percent of said matrix and said polymer comprises from about 40 weight percent to about 92 weight percent of said matrix.

37. The method of claim 1 wherein said hydrophobic polymer has a hydrophobicity of less than about 10 on either the hydrophilic lipophilic balance or solubility parameter scale.

38. The method of claim 1 wherein said hydrophobic polymer has a hydrophobicity of less than about 8 on either the hydrophilic lipophilic balance or solubility parameter scale.

39. The method of claim 1 wherein the carrier is carbon black.
40. The method of claim 1 wherein the carrier is hydroxyapatite.
41. (Three Times Amended) A method of making a device for controlled release of at least one pesticide useful for retarding or preventing decay or deterioration of a wooden object by pests, said method comprising the steps of:
- (a) binding at least one liquid pesticide to carrier particles to produce pesticide-containing carrier particles; then
 - (b) combining said pesticide-containing carrier particles with a thermoplastic hydrophobic polymer to produce said device, wherein the amount of pesticide bound to the carrier particles is sufficient so as to achieve a release rate of the pesticide from said device in the range from 0.4 $\mu\text{g}/\text{cm}^2/\text{day}$ to 40.4 $\mu\text{g}/\text{cm}^2/\text{day}$.
44. The method of claim 1, wherein the release rate of the pesticide from the controlled release matrix is reduced so as to retard or prevent decay or deterioration of the wooden object by pests for a period of at least about 7 years.
45. The method as recited in claim 1, wherein the polymer is low density polyethylene.
46. The method as recited in claim 1, wherein the at least one pesticide is an insecticide.
47. The method as recited in claim 1, wherein the pesticide is selected from the group consisting of pyrethrin, tefluthrin, permethrin, cypermethrin, fenoxycarb, chlorpyrifos, lambdacyhalothrin, resmethrin, deltamethrin, cyphenothrin, cyfluthrin, and combinations thereof.
48. The method claimed in claim 1, wherein the pesticide is lambdacyhalothrin.

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49. The method claimed in claim 1, further comprising the step of shaping the mixture of the pesticide-containing carrier particles and the polymer into a multi-laminate sheet.

50. The method claimed in claim 34, wherein the sheet has a thickness in the range from about 60 mil to about 120 mil.

51. The method claimed in claim 1, wherein said at least one pesticide comprises from about 5 to about 30 weight percent of the matrix.

53. The method as recited in claim 41, wherein the polymer is low density polyethylene.

54. The method as recited in claim 41, wherein the at least one pesticide is an insecticide.

55. The method as recited in claim 41, wherein the pesticide is selected from the group consisting of pyrethrin, tefluthrin, permethrin, cypermethrin, fenoxycarb, chlorpyrifos, lambdacyhalothrin, resmethrin, deltamethrin, cyphenothrin, cyfluthrin, and combinations thereof.

56. The method as recited in claim 41, wherein the pesticide is lambdacyhalothrin.

57. The method as recited in claim 41, wherein the release rate of the pesticide from the matrix is between about $0.7 \mu\text{g}/\text{cm}^2/\text{day}$ to about $20.6 \mu\text{g}/\text{cm}^2/\text{day}$.

58. The method as recited in claim 41, wherein the device is in the form of a rod, sheet, sleeve, strip, or pellet.

59. The method claimed in claim 41, further comprising the step of shaping the device into a sheet having at least one additional layer.

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60. The method claimed in claim 59, wherein the at least one additional layer is selected from the group consisting of polyethylene terephthalate, polyvinylidene chloride, and combinations thereof.

61. The method claimed in claim 41, further comprising the step of shaping the device into a multi-laminate sheet.

62. The method claimed in claim 41 further comprising the step of shaping the device into a pellet.

63. The method as recited in claim 41, wherein the polymer is selected from the group consisting of low density polyethylene, high density polyethylene, vinyl acetate, urethane, polyester, silicone, neoprene, isoprene and combinations thereof.